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RECENT OUTSTANDING ADVANCES IN

SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE • MARCH 16, 1946

MAR 25 1946
DETROIT

Tomorrow's Scientists

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A SCIENCE SERVICE PUBLICATION

TWENTY-FIFTH ANNIVERSARY 1946

GENERAL SCIENCE

Science Scholarships

16-year-old "vacant lot" ecologist shares top honors in Science Talent Search with 17-year-old girl who hopes to become a brain surgeon.

See Front Cover

► BRAINS LITERALLY won a $2,400 college scholarship for a 17-year-old girl, while the other top Westinghouse Science Scholarship in the Fifth Annual Science Talent Search went to a 16-year-old boy, whose science studies began in a vacant lot near his home. The winners are Marilyn Rohrer, 306 College Ave., Elizabethtown, Pa., and Jules Kernen, 5065 Oleatha Ave., St. Louis, Mo.

Portraits of the top winners are shown on the front cover of this SCIENCE NEWS LETTER.

Eight other high school seniors were awarded Westinghouse Science Scholarships worth $400, while 30 received one-year $100 scholarships.

Jules

Proving that science laboratories are where you find them, Jules Kernen, who won a $2,400 scholarship, made an ecological survey of a three-acre lot inside the city of St. Louis in which he catalogued 245 different varieties of plants and animals in one month. Medical research also interests Jules and he hopes to help find the causes of cancer. In addition to his ecological survey in the vacant lot, he has experimented with white rats to study nutritional deficiencies, and has published the results of some of his work.

Marilyn

Miss Rohrer, who hopes to become a brain surgeon, boasts a collection of carefully preserved brains from such animals as squirrels and dogs and even has a human brain carefully preserved for study. Jokingly called "the brain" by her friends, her interests are not limited to science. She is a "hot" trumpet fan of the Harry James school. Her brain exhibit at the Science Talent Institute consisted of 33 different specimens weighing 80 pounds.

Alternates to the $2,400 scholarships are two $400 winners, Josephine Raskind, 16, 108-21 70th Ave., Forest Hills, N. Y., and Stephen Arnold, 17, 1128 Washington St., Oak Park, Ill., a student at Culver Military Academy.

A student of embryology, Miss Raskind conducted extensive experiments with small snails.

In his study of cosmic radiation by use of Geiger counting tubes, Stephen Arnold found that commercial tubes were too expensive so he built his own. He plans to continue his study of high energy particles.

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SCIENCE TALENT INSTITUTE ***—Alternates for the $2,400 scholarships are shown on the top row of the facing page: left, Stephen Arnold and right, Josephine Raskind. Center, Henry Wallace talks to a group after addressing a session of the Science Talent Institute. Second row left, Stephen Arnold, Marilyn Rohrer, Jules Kernen, and Josephine Raskind congratulate one another, Dr. Glenn T. Seaborg discusses new chemical elements with a group. The $400 scholarship winners below are: Douglas Baird, Richard Lewontin, Gordon Newkirk, Abraham Schweid, Arthur Sicular and Harold Zirin. Photographs by Fremont Davis, Science Service staff photographer.***

GENERAL SCIENCE

Science and Our Future

Military operations and scientific research are two different kinds of activity, and neither should be subordinated to the other.

By DR. E. U. CONDON
Director, National Bureau of Standards

Address given before the Awards Dinner of the Fifth Annual Science Talent Institute, March 5, 1946.

► WE ARE MET here tonight to do honor, not only to the 40 boys and girls who are the winners in the Fifth Annual Science Talent Search, but also to the thousands of boys and girls throughout our land and throughout the world, who are our hope for the scientific development of the future. You 40 are bright boys and girls. You are therefore intelligent enough to realize that you are fortunate. You know that there are plenty more of equal promise and enthusiasm back home where you come from. You know that your presence here does not mean that you are already "made" as scientists. You know that it simply means that you have shown yourselves worthy of the support and encouragement which Westinghouse Science Scholarships afford.

And you know that with this support you accept a responsibility to work for maximum self development, as creative scientists and good citizens.

The future of science in the world indeed need give us no concern if in every land the boys and girls of eager intelligence comparable to yours will be sought out and given the opportunities for growth which await you. I have no fears for the future if we entrust it to free, inquiring, critical minds such as yours.

But, my young friends, there are quite a few of your elders gathered here tonight, and there are some things I want to say to them. The people of my generation and those who are my elders, have made quite a sorry mess of the world in which you are going to have to live. I want to talk to them about some things we need to do right away—in the next few years—to make amends as best we can, while you are acquiring the background knowledge and technique with which you will make your contributions to science in the future.

Millions are dead, millions more are homeless, hungry and shivering, at the end of the worst war in man's history. In America we have been more fortunate, although even here we have war-born difficulties—there is, for instance, a serious shortage of women's stockings made of a particularly favored synthetic fiber!

The war's destruction far exceeds that of any catastrophe yet known. The war ended with the application of a new weapon that is a thousand times more frightful than the weapons which produced most of the war's frightfulness. And already we have responsible state-

ments from scientists who made this development, that bombs a thousand times more powerful than those already used are capable of being made in the near future. There are men living who know how to make a single bomb whose destructiveness is equal to a million ton-ton blockbusters. One such bomb, dropped on Washington or any other major city, may be expected to wipe out its population, to destroy its buildings utterly, and to render the site uninhabitable due to poisoning by radioactive materials.

In the face of this situation, people react essentially in one of two ways. The first kind say: "It's just another weapon. Mankind learned to adapt to the long bow, and the cross bow, and the B-29. We have always had wars." An extreme expression of this kind is found in a speech by Prof. Leslie A. White of the anthropology department of the University of Michigan, delivered in Philadelphia last December. He says, "As for the extermination of the human race as a consequence of hurling atomic thunderbolts, this too may be admitted as a possibility, and all we can say is that if it is to come it will come." This is indeed a rather coldly hopeless, fatalistic expression. Prof. White further says, "Extravagant expressions of horror will not alter the course of events."

There is a certain rhetorical trick here in that in our language, "extravagant" connotes exaggeratedly inaccurate and thus emotionally detracts from the serious warnings which responsible physicists are trying to give us. Now I would agree that expressions of horror *alone* will not alter the course of events. But I insist that if we look at what civilization has suffered in World War II, even before the atom bomb, and couple it with the picture of a war with plentiful use of the old-fashioned one hoss shay atom bombs, and further with the picture of a war with both sides equipped with the really potent 1950 models—then, I say, no expression of horror of which our hearts are capable can be exaggerated or extravagant. I say we need not and should not fatalistically await death, reading papers to an academic society, meeting in a museum in Philadelphia.

The second kind of people react differently. We say, this is the end. Mankind has brought down suffering and death on its head, spiritual values have been destroyed, hatreds have been nourished and developed into great social cancers by war, and the war fears, and the war suspicions and divisions among men.

This has been going on since the beginning of time and will surely destroy us all if we let it continue. This second kind of people say simply that this must stop. We say there is such a thing as progress toward a higher level of development. With all the stumbling and fumbling, we see an upward trend throughout human history. We read the lesson of history to be that men can go forward together, and that men can progress to new freedoms, and new areas of social adjustment.

We see that man's growing mastery over the forces of nature also serves to amplify the magnitude of the social crises which confront him. Centuries ago, wars were local affairs. However, terrible, they affected only relatively small sectors of civilization. But the last two major wars were world wars in a true sense. Their damage literally affected everyone. We face a situation in which a future world war, employing atom bombs, in rockets guided by radio, and many other marvels of man's perverted ingenuity, will achieve a destructiveness thousands of times greater than ever achieved before. The magnitude of the crisis is such that we must soberly think of the choice as being between drifting into a war which will lead to the destruction of civilization, leaving a remnant of stunned, confused, poverty-stricken, frightened men and women amid the ruins,—or a wholesome healthy development of a united mankind, using its intelligence cooperatively for the good of all.

I beg of you, cast in your lot with the persons of the second kind—the people who believe there is a possibility that men throughout the world can live in freedom and justice, in love and goodwill, that they can devote their full energies to constructive application of the rational thinking to call science to the arts of peace. In asking you to join with us, I make no promise of certain security. I only promise hope, and tell you that the other way leads to certain doom. If we try to establish the brotherhood of man on earth we may fail, but if we do not even try we shall surely fail, and what an unbearable load of guilt our consciences will then have to carry.

So much for the generalities of the situation in which we find ourselves. Now, if I may, I would like to comment a little more specifically on the immediate choices which lie before us.

We must assert ourselves in every kind of agency of world cooperation toward positive wholesome working together for human welfare. This means the fullest kind of active support to the efforts of peoples everywhere to go forward, in political and economic freedom, to the highest level of educational, scientific and cultural achievement. This means specifically support to UNO, UNRRA, and UNESCO and whatever other such activities lie ahead.

We must particularly seek to bring about closer working relationships with our friends and allies, the Russians. Russia and the United States are today the most powerful nations in the world so unless we can get along together, there is no hope for peace. We must seek to recapture something of the feeling of joy and pride we had in being on their side, after Stalingrad and during their long, arduous drive to push the Nazi war machine out of their devastated lands. We must welcome their scientists to our

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Westinghouse Science Scholarship Winners

GRAND SCHOLARSHIPS OF $2,400

Rohrer, E. Marilyn, Elizabethtown, Pa.
Kernen, Jules Alfred, St. Louis, Mo.

ALTERNATES

Raskind, Josephine Baron, Forest Hills, N. Y.
Arnold, Stephen Reynolds, Culver, Ind.

SCHOLARSHIPS OF $400

Raskind, Josephine Baron, Forest Hills, N. Y.
Arnold, Stephen Reynolds, Culver, Ind.
Baird, Douglas Page, Whitesboro, N. Y.
Lewontin, Richard Charles, Forest Hills, N. Y.
Newkirk, Gordon Allen, Jr., West Orange, N. J.
Schweid, Abraham Isaac, New York, N. Y.
Sicular, Arthur, New York, N. Y.
Zirin, Harold, Bridgeport, Conn.

ALTERNATES

Roemer, Elizabeth, Alameda, Calif.
Hummel, James Alexander, Los Angeles, Calif.
Gall, Walter George, Garfield, N. J.

SCHOLARSHIPS OF $100

Jackson, Dorothy Jean, South Charleston, W. Va.
Jones, Elaine Carlota, Mill Valley, Calif.
Karasz, Ilonka, St. Albans, N. Y.
Kingman, Alice May, Eugene, Oreg.
Kohnen, Dorothy Margaret, Chicago, Ill.
Laufer, Elizabeth Ursula, Villanova, Pa.
Lines, Joan Louise, Syracuse, N. Y.
McMillin, Patricia Ruth, Boulder, Colo.
Roemer, Elizabeth, Alameda, Calif.
Bush, Leon Reginald, New York, N. Y.
Champeny, John Charles, Wellington, Kans.
Cudaback, David Dill, Napa, Calif.
Cumming, James Burton, St. Albans, N. Y.
Durell, Jack, New York, N. Y.
Gaines, George Loweree, Jr., Hamden, Conn.
Gall, Walter George, Garfield, N. J.
Gibson, James Benjamin, Ellensburg, Wash.
Herbert, Donald Edmonds, Jr., Tulsa, Okla.
Hopkins, John Taylor, IV, Washington, D. C.
Hummel, James Alexander, Los Angeles, Calif.
Johnson, Russell Dee, Jr., Granite City, Ill.
Kindig, Neal Bert, Medicine Lodge, Kans.
Larson, Daniel Herbert, Downers Grove, Ill.
Ludwig, Gerald Wilbur, New York, N. Y.
Sack, Seymour, Poughkeepsie, N. Y.
Seely, Gilbert Randall, Blaine, Wash.
Shields, James William, San Francisco, Calif.
Shombert, Donald James, Pittsburgh, Pa.
West, Robert C., Jr., Upper Montclair, N. J.
Widing, Kenneth Gordon, Brainerd, Minn.
Judges: Dr. Steuart Henderson Britt, Dr. Rex E. Buxton, Mr. Watson Davis, Dr. Harold A. Edgerton.

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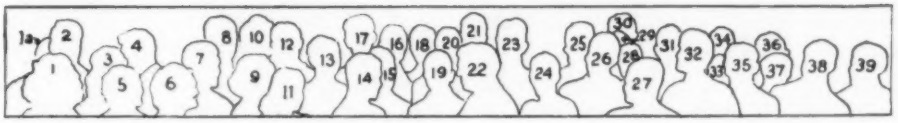
laboratories, as they have welcomed ours to theirs, and extend the base of scientific cooperation with this great people. Of course we must behave this way toward the scientists of all nations—I only mention Russia because she is right now the target of attack by those irresponsibles who think she would be a suitable adversary in the next world war.

We must regain for all scientists that freedom from military domination which is so necessary if science is to be used for peaceful ends. With Nazism not wholly exterminated, we must have scientists contributing to the development of our tools of war, since, God forbid, we may, if all else fails, have to use them. But the scientific life of the country must not be subordinated to, nor derive its chief support from, the military.

This is essential in the interests of the military themselves. Because the scientific spirit is so completely opposite to the military spirit, science simply will not go forward under domination. Nowadays men must work together in large organizations. It is characteristic of the military organizations that operations are planned and directed from the top, with the details executed by men below, by persons who unquestioningly and obediently respond to the orders given them from above. The flow of original thinking is from the top to the bottom. I conceive just the opposite to be true in a properly administered scientific organization. The function of a scientific director is to set up working conditions where the lowliest novitiate is put in touch with all the problems in his field and encouraged to worry about them and to come out creatively with new ideas and results. He is the sole judge of what knowledge he needs in order to work effectively on his problem. The flow of original thinking in this case is mainly from the bottom to the top.

Every worker must have access to the whole story because no one can foresee which scientist will have the truly creative idea. And each scientist must be free to discuss his ideas, while in the formative state, with his colleagues anywhere, for it is from the working together of many minds that new science comes.

In contrasting the military and scientific, I do not wish to imply that one is wholly wrong and the other wholly right. Just as I do not recommend the military procedure for the conduct of scientific research, neither would I want our safety to depend on the outcome of a battle in which the scientific method of free discussion, independent thinking and mutual criticism was followed by all the captains and lieutenants on the battlefield. Military operations and scien-



VISIT TO CAPITOL—The group of winners met the President of the Senate, Hon. Kenneth McKellar. They are: 1 Kingman, 1a Widing, 2 Herbert, 3 Raskind, 4 Durell, 5 Roemer, 6 Kohnen, 7 Gaines, 8 Zirin, 9 McMillin, 10 Hopkins, 11 Karasz, 12 Champeny, 13 Lewontin, 14 Newkirk, 15 Larson, 16 Bush, 17 Cudaback, 18 West, 19 Sack, 20 Sicular, 21 Johnson, 22 Hon. McKellar, 23 Shields, 24 Jones, 25 Baird, 26 Hummel, 27 Schweid, 28 Lines, 29 Shombert, 30 Seely, 31 Ludwig, 32 Arnold, 33 Rohrer, 34 Kerner, 35 Cumming, 36 Gall, 37 Laufer, 38 Gibson, 39 Jackson.

tific research are two quite different kinds of human activity and neither should be subordinated to the other.

Of course my reason for stressing this point is that right now we are confronted in America with a situation in which scientists are being held very strictly under military domination, to the severe detriment of our scientific development and the development of wholesome international relations.

What is going on? Prominent scientists are denied the privilege of traveling abroad. Physicists are not allowed to discuss certain areas of their science with each other, even as between individuals working on closely related phases of the same subject. They can only communicate through official channels, involving censorship of their communications by army officers without knowledge and so without competence. Information essential to understanding is being denied to students in our universities, so that, if this situation were to continue, the young students we honor here tonight will get from their professors only a watered-down army-approved version of the laws of nature.

In this connection one is reminded of the Holy Scriptures, where in the 18th verse of the 8th chapter of Ecclesiastes we read,

"Wisdom is better than weapons of war; but one sinner destroyeth much good."

The laws of nature, some seem to think, are ours exclusively, and that we can keep others from learning by locking up what we have learned in the laboratory and not telling it to our allies. Later they will learn what we know and more besides, which because of our unfriendly behavior, we cannot expect them to tell us. In the course of time, because of such provocations, we are allies no more—we start as friends and end as snarling, suspicious neighbors.

It is sinister indeed how one evil step leads to another. Having created an air of suspicion and mistrust, there will be persons among us who think other nations can know nothing except what is learned by espionage. So, when other countries make atom bombs, perhaps much better than those we have, these persons will cry "Treason" at our scientists, for they will find it inconceivable that another country could make a bomb in any other way except by aid from Americans.

Let us cast this isolationist, chauvinist poison from our minds before we corrode our hearts and arouse suspicions of our motives in the minds of the decent peoples of the world. Let us cooperate wholeheartedly with the other nations of the world to agree to use atomic energy only for peaceful purposes and to set up an inspection system to enforce such agreement. The United Nations Assembly has unanimously voted to establish an Atomic Energy Commission to draw up such a plan. In the face of the frightfulness of atomic warfare, it is inconceivable to me that any nation will refuse to participate in a program of international cooperation and inspection. Yet, much public discussion, and even more private conversation, is based upon the assumption of such a refusal. We must push forward with all possible speed in order to find out where we stand in the world today so that it is no longer possible for different groups and different nations to base their thinking and their planning upon different hypotheses. I am confident that if we do this the outcome will be world friendship and cooperation, and not atomic war and the destruction of civilization.

In closing I would like again to quote Scripture, this time the New Testament, 17th verse of the 8th chapter of Luke:

"For nothing is secret, that shall not be made manifest, neither anything hid that shall not be made known and come abroad."

Finally, I want to read to you from a poem by Elizabeth Barret Browning, called "The Truth Is Whole":

"Use is the aim of Science! give again
A golden sentence to the faithful pen—
Dwell not on parts! For parts contract the mind;
And knowledge still is useless when confined,
The yearning soul, enclosed in narrow bound
May be ingenious, but is ne'er profound:
Spoiled of its strength, the fettered thought grows tame;
And want of air extinguishes the flame!"

My young friends, do not be depressed by my remarks. Go on, work hard, enjoy to the fullest the expanding view and the communion with nature which your study of science will bring—the while, I hope, we others shall join together in healing war's wounds, and making the kind of world in which your talents can have free play to develop wholesome applications to human welfare for all the peoples of the world.

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"The investigation which I conducted was manifestly of a preliminary nature, as it was impossible for me to study completely the hundreds of species of organisms found within the area. Nevertheless, I have proved that all of the axioms of bio-ecology can be demonstrated from the intensive study of an area no larger than three acres. In addition, I have learned the characteristic features of the flora and fauna to be found near my home. Finally, I have gained a clear conception of the method that can be utilized by the entomologist, parasitologist, or bacteriologist in conquering our numerous organic foes, such as certain species of insects and bacteria. Perhaps it is too optimistic to hope that, some day, man, aided by the knowledge gained from ecological studies, will be capable of eradicating all of the insects that devour his crops and transmit disease from organism to organism. Yet who is able to say what the scientist of tomorrow will be able to accomplish when we contemplate the recent unleashing of atomic energy?"—From the essay of Jules Alfred Kernen.

"The value of anesthetics to mankind cannot be overestimated. Besides making possible the wonders of modern surgery, they have enabled biochemists to use lower animals in the study of diseases and methods of surgery. Since the introduction of ether by Dr. Crawford Long, of Jefferson, Georgia, in 1842, scientists have been searching for the perfect anesthetic. I believe a great step forward was made toward this end when our scientists discovered the modern anesthetic, intravenous pentothal sodium, a barbituric acid derivative.

"My interest in this anesthetic is a direct result of my detailed study in the past year of all types of anesthetics. This study itself was in conjunction with my intense desire to study brain surgery, a desire I have had as far back as I can remember."—From the essay of E. Marilyn Rohrer.

Nylon fabrics are improved in handle and appearance by heat treatment; they become softer and more mellow.

When the high-frequency *ultraviolet energy* of a low-pressure mercury arc, such as that inside a fluorescent lamp, is used for killing bacteria and fungi it is called germicidal radiation.

PHYSICS

Birth Of Atom Splitting

First evidence that atoms can break apart was discovery of natural radioactivity and spontaneous change of radium into uranium and thence into lead.

➤ EVEN NINETEENTH-CENTURY physics and chemistry, which regarded atoms as solid, unsplittable little lumps of unchangeable matter, provided hints that eventually gave the world an entirely different picture of the atom and led the way to its explosion into energy, with most dramatic demonstration in the atomic bomb, Dr. Lise Meitner, visiting professor of physics at the Catholic University of America, told 40 finalists in the Fifth Annual Science Talent Search.

German-born Dr. Meitner, whose permanent post now is with the Royal Swedish Academy of Sciences in Stockholm, pointed out that as soon as the Russian chemist Mendeleef had arranged the elements according to their atomic weights in his classic periodic table, the rhythmic recurrences of numerical relations between and within the various groups suggested that atoms were not simple, indivisible particles but that they had a composite structure, being made up of still smaller particles that we have since come to know as electrons, protons and neutrons. The many bright lines in the spectra given off by elements when heated provided another hint of the probable complexity of atomic structure.

First solid evidence that atoms can break apart, and that in so doing they become atoms of another element, was provided by the discovery of natural radioactivity, and the spontaneous change of radium into uranium and thence into lead, at about the turn of the century. At the same time, the theoretical work of such scientists as Bohr and Einstein strengthened the indication that all atoms are made of separate particles, and that if attacked in the right way they can be broken in pieces.

This stimulated the rising generation of physicists in their efforts to achieve in the laboratory the effects that had been shown as theoretically possible. First attempts resulted simply in the peeling off of some of the outside electrons from atoms. Later, the tight little nucleus itself, at the heart of the atom, was torn apart. Dr. Meitner's own work was of key importance in this, since she was the first to offer an explanation of the relatively huge release of energy resulting from the disruption of the atomic nucleus.

From this explanation, other physicists proceeded to work toward material and practical application. First result, under the spur of wartime necessity, was the terrible atomic bomb. The future may see a more gradual and ordered release of atomic energy in fuelless power plants.

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MEDICINE

Young Scientists Asked To Develop Antibiotics

➤ THE NATION'S most scientifically talented high school boys and girls were given the mission of finding new remedies like penicillin and the sulfa drugs for conquering infantile paralysis, influenza, the common cold and other still-unconquered virus-caused diseases.

The boys and girls are the 40 winners of the Fifth Annual Science Talent Search. Their life-saving mission was given them by Dr. Selman A. Waksman, of Rutgers University and the New Jersey State Agricultural Experiment Station, who, with his colleagues at these institutions, discovered streptomycin, new and powerful ally of penicillin in disease fighting.

Speaking at the Fifth Annual Science Talent Institute, Dr. Waksman said:

"Although many infections, notably those caused by viruses, still remain uncontrollable, the hope exists that sooner or later these will come under control.

"It is to you, the scientists of the future, that we are all looking to enlarge your knowledge, to discover new scientific principles, and to apply those already known to improving the health and the very life of man."

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Succulent plants, particularly lilacs, and certain cut flowers can be kept fresh and in a crisp condition for many extra hours by a vacuum treatment in which air in the plant tissues is replaced by water.

The *marabu,* a troublesome 12-foot shrub of Cuba, that overruns thousands of acres of agricultural land, has two points in its favor: it makes excellent charcoal and is a soil-builder because it is a legume with soil bacteria on its roots.

FURTHER EXPLANATION—Dr. Meitner, surrounded by a group of eager boys and girls, winners in the Fifth Annual Science Talent Search, discusses the structure of matter after her talk before a session of the Science Talent Institute. (Left to right: Hummel, Meitner, Karasz, Gibson, Arnold, Gaines.)

CHEMISTRY

All-Wool Suits For Hot Weather

➤ ALL-WOOL suits for hot weather, and warmer winter wool suits of lighter weight than present clothing, are predicted by use of a new textile chemical which also controls shrinkage and gives long-lived creases in the trousers. The chemical, a development of the Monsanto Chemical Company in St. Louis, held shrinkage to less than 2% after five washings of a treated wool shirt in soap and water.

Wool yarn, treated with the chemical which will be known as Resloom, is capable of imparting "extreme coolness" to woolen textiles because it stabilizes the wool fiber so that it can be woven into an extremely thin yet highly serviceable fabric, the company claims. At the same time, it imparts smoothness and flatness to the cloth, instead of the hill-and-valley contours of ordinary woolen weaves. A year may elapse before the new wool suits are on the market.

The same stabilizing influences will enable wool processors to make winter suits of lighter weight and greater strength, it is stated. This will involve increasing the thickness dimension of the cloth and decreasing the amount of wool actually used without sacrificing strength, style and serviceability.

Resloom is a melamine-formaldehyde resin used to impregnate the tiny hollows of individual fibers, imparting shrinkage control, stability, wrinkle resistance, and crease retention. It can be applied on existing mill equipment. It can also be used with rayon and cotton. To them, it gives a superior finish and, a company scientist states, "makes possible a dress which does not bulge in the wrong places after it has been worn a few times."

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ENGINEERING

Peat Processing Machine Perfected in Sweden

➤ A PEAT PROCESSING machine, perfected in Sweden where considerable peat is used as fuel, is reported by the U. S. Department of Commerce (*Foreign Commerce Weekly,* Feb. 9). The machine produces hard tubular sections of compressed peat. They do not absorb water, and remain dry so that they can be transported, stored and burned without crumbling. The peat tubes can be handled like coke.

The machine, weighing one ton, is easily portable and is used adjacent to the peat beds. The wet peat is pulped to a uniform mixture. The machine presses the pulp through a nozzle which forms it into tubular sections which are air-dried for two weeks. The moisture content is then about 20%, and the peat ready to be used as fuel. Further storage under roof reduces the moisture content to about 15%.

These peat tubes, prepared at a reasonable cost, burn well because of the air circulating through and around them. They burn, also, without the detrimental formation of tars, and without waste through the grates due to crumbling.

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ETHNOLOGY

Study of Ancient People Who Fought "Nazis" Honored

➤ FOR HIS study of an ancient people who successfully fought off the Nazis of their time, Boris Piotrovsky has been awarded the Stalin Prize.

Mr. Piotrovsky's book, The History and Culture of Urartu, summarizes many years of work by Soviet historians and philologists on an ancient civilization in the territory of modern Armenia about the thirteenth century B.C.

The Land of Urartu, a powerful kingdom of more than 30 centuries ago, was an important civilization in the Trans-Caucasus area, and the prize-winning book relates the successful struggle of the people of Urartu against the Assyrians who tried to dominate the civilizations of the ancient world.

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CHEMISTRY

Three Plants to Produce Anhydrous Ammonia

➤ THREE PLANTS that produced anhydrous ammonia for Army Ordnance use during the war have been turned to civilian production of the critical material, needed for fertilizer manufacture, the War Department has announced.

Army Ordnance plants in Ohio, Kansas and Arkansas will supply 4,000 tons of anhydrous ammonia per month for fertilizer production to help relieve the shortage.

It was also reported that Army Ordnance has sold an excess supply of 35,000 tons of anhydrous ammonia through the Office of Defense Supplies since V-J day.

Science News Letter, March 16, 1946

IN SCIEN

MEDICINE

Ice Bag on Arm Used In Penicillin Injections

➤ A NEW METHOD of giving penicillin, with an ice bag on the arm for two hours before the injection, is reported by Lt. Comdr. Max Trumper and Comdr. Gershom J. Thompson, of the National Naval Medical Center, Bethesda, Md. (*Journal, American Medical Association,* Mar. 9).

The object of the ice bag is to chill the tissues and slow blood circulation so that the penicillin will be absorbed more slowly and its action will be prolonged.

Patients will be pleased with this method of giving penicillin because it makes the injection, or "shot", painless, and reduces the number of times the penicillin must be given. In uncomplicated gonorrhea, in which the new method was tried, the penicillin was all given in one dose, instead of in four or more as has been customary.

The cure rate, 91%, when 100,000 units of penicillin was given in the single dose, compares favorably, the Navy doctors report, with the cure rate when penicillin is given by other schedules or in mixtures of beeswax and peanut oil to delay absorption.

Science News Letter, March 16, 1946

ENGINEERING

Jordan Valley Development Planned by Engineer

➤ JORDAN river water, to redeem the desert land along much of the river's course, flows closer to realization of a vision of modern prophets with the departure for Palestine of John Lucian Savage, who made the plans for Boulder and Grand Coulee dams, and more recently outlined an ambitious project for taming China's terrible Yangtse river and putting its waters to useful work.

Mr. Savage, until recently chief designing engineer for the U. S. Bureau of Reclamation and now on loan to the State Department, will appear before the Anglo-American Commission in Jerusalem, to discuss the technical details of a plan for developing the water resources in the Holy Land, to produce power as well as to irrigate arid lands in the Jordan valley.

Science News Letter, March 16, 1946

E FIELDS

PHOTOGRAPHY

New Photographic Printing Papers Now Available

➤ NEW PHOTOGRAPHIC printing papers now available will save amateurs hours of wearisome waiting in the darkroom and enable professionals to do high-quality rush jobs.

The new papers shed water duck-fashion because the base is impregnated with an acetate which practically waterproofs it. Only one minute is needed for developing the prints, two minutes for fixing and four minutes for washing them. In a smooth, white finish, the papers are offered in both contact and projection printing types.

The papers were produced by the Research Laboratories of the Eastman Kodak Company to meet needs of the Army and Navy Air Forces. Because in addition to speed the Armed Forces demanded papers which would not stretch, shrink or swell, industrial and commercial photographers now have paper which can be used for exacting copy and reproduction work.

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ENGINEERING

Paper Houses May Help Solve Housing Problem

➤ PAPER HOMES may help solve the nation's tremendous demand for low-cost permanent houses that can be built in a short time.

Recent experiments by the Consolidated Water Power and Paper Company, of Wisconsin Rapids, Wis., have resulted in a paper plastic building material known as Consoweld, which is said to be stronger and more fire-resistant than wood and more enduring in some respects than steel, although it is comparable in weight to aluminum.

A sample three-room cottage, built almost entirely of this material, has been set up for tests. Except for a simple concrete foundation, the entire building was carried to its location on a single truck, including walls, ceilings, partitions, stove, sink, icebox, oil heater and plumbing fixtures, and was set up in a small fraction of the time needed to build a three-room cottage of conventional type.

The firm has also designed a "packaged bathroom," complete with walls and plumbing fixtures, which may enable rural dwellers to acquire modern conveniences by simply ordering a complete bathroom which will come to them in one carton.

Consoweld consists of two thin panels of hard, compressed paper impregnated with resin and held apart by wood strips. The space between the panels is filled with a fuzzy gray corrugated paper core, which insulates and soundproofs walls and doors.

Officials of the company state that they are not in a hurry to place their new product on the market, because they want to be certain that it is "just right" when they do. They are in the process of establishing specifications, they say, and these are not yet available for publication.

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AERONAUTICS

Hydraulic Catapults Used To Launch Carrier Planes

➤ HYDRAULIC catapults on the flat decks of aircraft carriers enabled American planes to get into the air faster than the enemy's aircraft, the Navy has revealed.

One of the Navy's most carefully guarded war secrets, the hydraulic catapult system launched planes from flat decks with more speed and under less favorable wind conditions than the more cumbersome equipment previously used.

The hydraulic catapult permitted the operation of 40% more planes by carriers, made night take-offs safe, allowed carrier forces to carry on full scale operations at sea for extended periods and made our carrier force the most potent in the world, the Navy said.

Used in the aircraft carrier war in the Pacific and by escort carriers in the anti-submarine patrol of the Atlantic, the hydraulic catapult allowed planes to be launched with other planes in position on the flight deck. This spotting of planes made possible take-offs at an average time interval of 30 seconds aboard escort carriers with much smaller flight decks than the larger units had.

The secret of how our large carriers operated for long periods at sea was hidden in the hydraulic catapults aboard the CVE's (carrier escorts). By using the catapults, these smaller ships were able to carry twice as many replacement planes to the fleet carriers as they could have otherwise.

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AERONAUTICS

Combination Gas Turbine Engine for Transports

➤ COMBINATION gas turbine engines that drive conventional propellers and also furnish jet-propulsion will power new transport planes under order by the United States Air Lines with the Glenn L. Martin Company. These new coast-to-coast airliners, which will be ready for use during 1947, will have a top speed of around 385 miles an hour and a cruising speed of 365 miles, it is expected.

The engine to be used is a General Electric turbine. It burns kerosene or other low-cost fuel instead of the high-octane gasoline used in conventional engines in present airliners. In addition, these engines have narrower nacelles than conventional engines, thus decreasing the air resistance. Fuel consumption of the combination engine will be approximately one mile per gallon, as against one and one-half miles per gallon with conventional engines, but the speed will be much greater, thus making fuel cost substantially lower.

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AERONAUTICS

Door Cracks in Planes Literally Frozen Shut

➤ AIRPLANES of the probably near future, that will cruise the thin, cold air of the substratosphere, will need something to make a tight seal around doors and other necessary openings, so that the precious pressurized, warmed air in their cabins will not leak out. The idea of Warren A. Custer of Newton, Pa., is literally to freeze such cracks shut with a substance that is liquid at ordinary ground-level cold temperatures but that freezes at the 67 degrees below zero Fahrenheit encountered at high-level cruising altitudes. On this he has been granted U. S. patent 2,395,852.

While the patent covers any substance that will accomplish this end, the one which Mr. Custer concretely proposes is based on a mixture of dibutyl phthalate and wet nitro-cotton, to which other ingredients may be added if desired. An oily liquid at ordinary temperatures, it solidifies in subzero cold, clinging tightly to the solid surfaces to which it has been applied. When it is frozen it behaves like thick grease or wax, with a certain amount of "give," instead of being rigid and brittle like ice.

Science News Letter, March 16, 1946

GENERAL SCIENCE-EDUCATION

Science Talent Problems

The number of veterans returning to college for further scientific training is not as great as supposed. We must assure higher education for our ablest youth.

By DR. M. H. TRYTTEN

Director, Office of Scientific Personnel of the National Research Council

Address given before the Educational Conference of the Fifth Annual Science Talent Institute, March 5, 1946.

➤ I AM SURE that any one who has ever been a teacher can understand my pleasure at being privileged to speak about the brilliant group of scientific quiz kids who represent this year's winners of the Science Talent Search. People sometimes wonder what it is that keeps teachers in the profession when it would be in most cases easy to secure less exacting and more remunerative employment. I think it is wholly the real human satisfaction in helping in the development of minds such as these. There is no thrill quite like that of seeing your students grow into able, useful and successful working members of their profession. It is the promise of that, I believe, which gives us all joy in these young people today.

I think that at no other time has the Science Talent Search seemed so significant or symbolic. We have just finished a war in which science was not only dominant but decisive. I have often thought how interesting it would be if we could set up some kind of balance sheet to measure in terms of manpower the contributions of science in this war. Let us suppose, for example, that some supernatural being had come to our leaders in 1941 and taken them to a high place from where they could have seen the whole remaining course of the war in clear perspective. Suppose this being had then stated that he was going to remove all the radar developments of the next years from the picture but that he would in recompense grant the equivalent manpower supply to balance. How many men do you suppose would have been necessary? Take for example the radar fire control equipment which more than any factor gave us an overpowering advantage in naval combat. Or the navigation aids which made maneuvering at night at high speeds possible. Or the radar antiaircraft equipment; or the plane and ship and submarine locators; or dozens of other instruments which gave us such an astonishing advantage in almost all phases of combat. I think our leaders would have simply said there is no measurable equivalent. Because not only is there the brilliant performance of the present but the rich promise of uncounted years in the future. Hundreds of thousands of men mean little against such power. And then what of the manpower equivalent of the proximity fuze? or DDT? or of anti-malarials? or of the atomic bomb?

The question may seem a bit fantastic, and yet it is not as the following example will show. In the winter of 1943-44 the Manhattan District project found it necessary to expand its activities enormuosly to meet the challenge of the race against time. They needed great additions of scientific manpower. It was evident, however, that there was no supply of manpower in reserve. Throughout the war our policies did not permit of manpower reserves. A man was either indispensable to an essential project at the moment or he was inducted. As a result there appeared to be no available source of men. However, it happened that in the recruitment throughout the army of candidates for the ASTP a number of highly trained persons had been assigned to it and had thereafter been collected in so-called 9-A pools. There were several hundred of these who were made available and assigned to the atom bomb project to work in their laboratories as their military assignment. General Groves has said that "there are men without whom we could not have done this thing." I think it is worth while pointing out that this means that these several hundred men were, according to this statement, the difference between success and failure of this project. Here, then, in several hundred individual decisions, some one did make the mistaken decision that each of these men was of more value as an unassigned soldier than as a scientist. Only the good fortune that these men were not sent overseas before being assigned to the Manhattan District project permitted the nullification of these errors of decision and thus assured the acceleration of the atomic bomb project to success.

No one would seriously attempt to evaluate the worth of the atom bomb project as less than a few hundred unassigned soldiers. Yet, in fact, that was the accumulated effect of these several hundred individual decisions in the inductions of these men.

There is, however, plenty of evidence that the profound implications of the scientific contributions to our military strength during the war have created a desire in the United States to exploit further the possibilities then opened up. The services are very much alive to the need for sound scientific programs. This is shown in plans for extensive new laboratories and additions to old laboratories. The services are being reorganized to give further scope to scientific work. Extensive training programs are being expedited to create a corps of scientifically trained officers. And the services are planning to support basic science research in the universities and colleges of the land. Industry has sharply increased its role in research. New laboratories have been announced by a number of very large users of science. Most of our companies are either planning increased research activities or are seeking access to established research facilities. Universities and colleges are displaying unprecedented interest in their science departments. And the government, generally,

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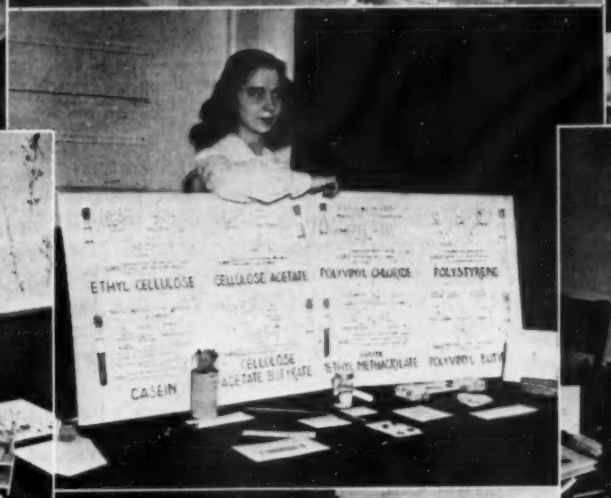
HOBBY NIGHT—Marilyn Rohrer, extensive collection of brains; Stephen Arnold, cosmic ray counting apparatus; Jules Kernen, results of ecological study of the flora and fauna of a vacant lot. Second row: Josephine Raskind explains her exhibit of the embryological development of Physa to Richard Lewontin; Joan Lines, sample of casein and information about other types of plastics; Elizabeth Laufer, topographic map of her school. Third row: Arthur Sicular, production of direct, constant voltage by induction; Abraham Schweid, miniature bacteriological laboratory; Gordon Newkirk, photographs of the moon he took through a six-inch reflector. Bottom row: John Champeny, reflecting astronomical telescope; Gilbert Seely, homemade spectroscope; Harold Zirin, eight-inch equatorial reflector telescope; Neal Kindig, natural forms of gypsum and plaster and cement test blocks.


ETHYL CELLULOSE
CELLULOSE ACETATE
POLYVINYL CHLORIDE
POLYSTYRENE
CASEIN
CELLULOSE ACETATE BUTYRATE
METHACRYLATE
POLYVINYL BUTY

BOTANY LINGUISTICS

NATURE RAMBLINGS

by Frank Thone

What Is a Shamrock?

➤ IRELAND'S SHAMROCK, probably the most-disputed plant in all botanic history, is really a yellow-flowered species of clover, Rev. Hugh O'Neill, professor of botany at the Catholic University of America, has decided after a careful re-examination of all available linguistic evidence. It is not, as frequently asserted, either the oxalis or the common white clover.

The notion that the shamrock was an oxalis apparently got started by Renaissance English writers. In Campion's History of Ireland, written in 1571, the shamrock is described as a three-leaved plant, sour-flavored, that grew along with watercress in woody places and was used as food. Only one plant fits that description, the wood-sorrel or oxalis (*Oxalis Acetosella*). This plant is also common in the United States.

The proper Gaelic name for the oxalis, Father O'Neill found on further searching, is not *seamrog* (pronounced "shamrock") but *seamsog*. The confusion may have arisen from the fact that in the Gaelic alphabet the characters for "r" and "sh" look very much alike. This very natural mistake, apparently made by an early English writer, was perpetuated for a long time, so that the oxalis became entrenched in English literature as the shamrock.

In Irish literature, Father O'Neill states, *seamrog* always means clover; the words for oxalis are *seamar coille* and *seamar gear*. A very early Celtic clover-word was *seamar*—the *-og* ending was picked up later.

Two kinds of clover that grow in Ireland have been contenders for the honor of being the true shamrock: the common white clover (*Trifolium repens*) and a yellow-flowered species known to botanists as *Trifolium dubium* v. *minus*. The overwhelming majority of Irish people, Father O'Neill states, favor the yellow-flowered plant, though the other species still retains its champions.

As independent confirmation, Father O'Neill cites an investigation made only a few years ago by a Benedictine scholar in the Glengarry region in Scotland where a few old people still speak the "old language". These elderly Gaelic-speaking Scots, born before 1850, all knew clover, and only clover, as *seamrog*, or shamrock.

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From Page 170

is quite concerned about its place in the furthering of science. There are for example two bills to be brought out in the Senate—one to create an ambitious science research foundation under Federal auspices and another to set up a Federal atomic energy research program. There seems every evidence that we are alert to expanding our physical facilities and providing the necessary funds.

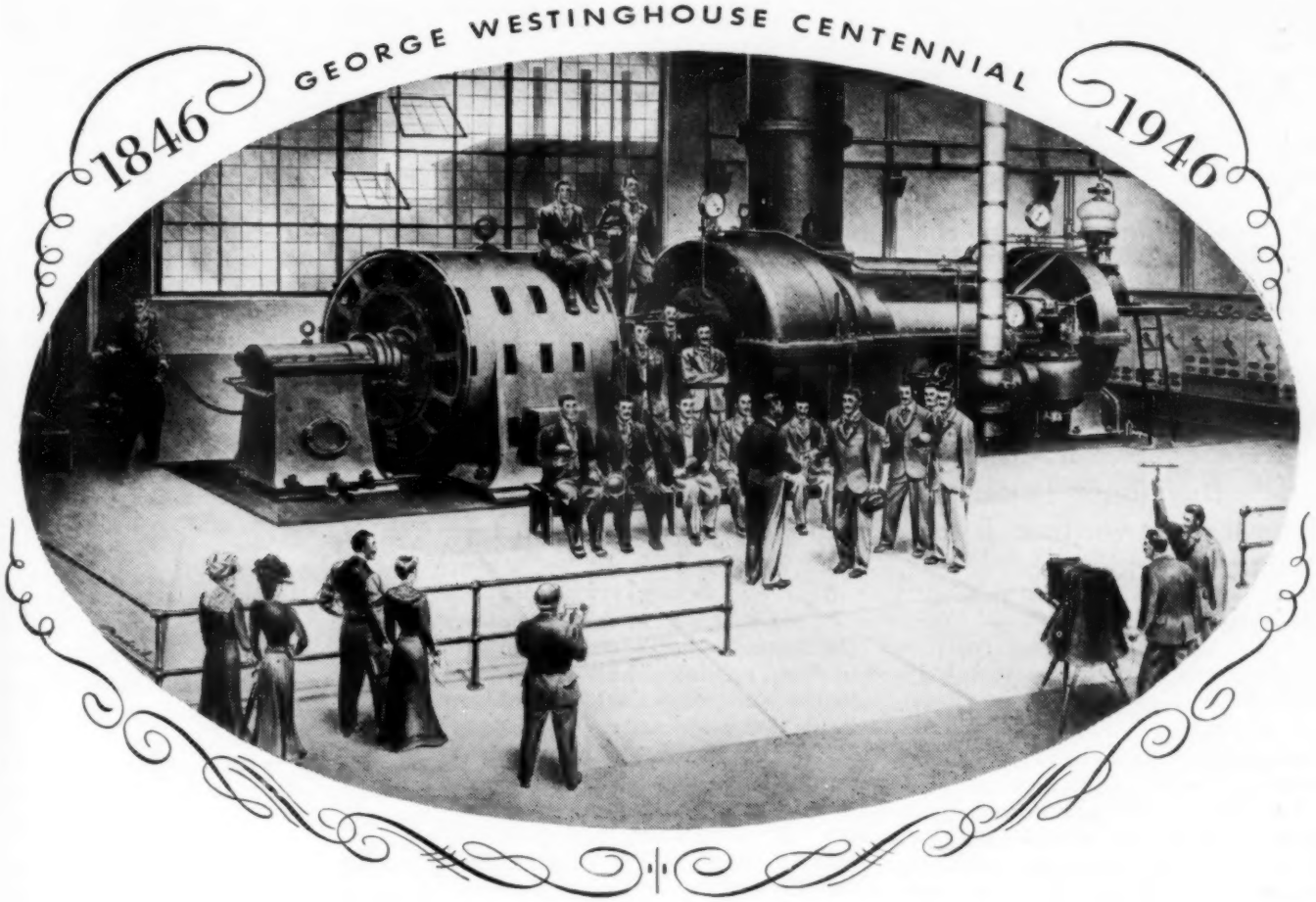
With regard to scientific manpower, the story is different. There is, and will be for some time, a shortage of such personnel. Throughout the war we began cutting down on training in some fields as early as 1940. From then on progressively the flow of trained manpower in the sciences was reduced. The resulting deficit is large and will be costly. That, of course, is past history and is well known.

The unfortunate aspect of the situation is that no positive recovery measures have been adopted.

The general attitude is that the present great flood of veteran students now on the campuses and about to return to them will quickly fill up the ranks of trainees in the sciences. There are, however, some very obvious limitations here. In the sciences the number of students who can register for advanced work is limited to those who have finished the preparatory work. The seniors who are now enrolling must once have been juniors, and the graduate students must once have been seniors. At present in the science graduate schools and in the sophomore, junior and senior classes in the sciences, the enrollments must be limited to those who left college for the services with unfinished courses, and in view of selective service history which began the pinch on enrollments at the freshman class and progressively rose through the years, there are not as large a number of returnees as is generally supposed. Information in my hands is incomplete, but it indicates that the graduate schools by and large are not full in most sciences in spite of scholarship programs and the release for advanced study of wartime research workers.

In a sampling of 57 universities, for example, the graduate enrollment in chemistry in the first semester was about 50% of the average for the immediate prewar years. Even with an additional 7% increase due to veteran enrollment, only 57% of the prewar average is indicated in the second semester. In the fields such as physics, mathematics and geology the graduate schools are similarly not crowded with G.I.'s to judge by returns from a sampling of institutions immediately preceding the end of the first semester. Results showed enrollments in physics as 16%, geology as 30% and mathematics as 12% of a normal prewar graduate enrollment. The non-veteran enrollment in these graduate schools in these fields was considerably greater, being in physics 83%, in geology 30% and in mathematics 100% of prewar norms. These higher enrollments are in large part made up of those students who were on war research and are now deferred to finish their training. In the undergraduate classes where no deferments are now granted in general to non-veterans and where the enrollments are therefore confined to veterans and physically disqualified students the enrollments are very low as is indicated by data collected. A sampling of enrollments of seniors in about 60 institutions at the end of the first semester gives in percentages of normal prewar enrollments, the following figures: in physics, veterans 9%, non-veterans 28%; in geology, veterans 10%, non-veterans 20%; in mathematics, veterans 11%, non-veterans 18%. The corresponding junior enrollments are in physics, veterans 12%, non-veterans 36%; in geology, veterans 25%, non-veterans 21%; and in mathematics, veterans 13%, non-veterans 18%. More complete canvasses are needed and will be obtained for the second semester as soon as possible. But the results quoted indicate quite definitely that there is not yet any sufficient flow of science students in the colleges to even approach the prewar numbers. And the existence of war time deficits should call for even much increased numbers.

To achieve a full program of training in the sciences so as to meet the great unfolding challenge of the future, to provide for our welfare and security and to lead the world to a higher level of comfort and stability through a higher technological standard of living, we should have a program as full and carefully



WHIRLING POWER

EARLY in life, George Westinghouse dreamed of a new and better source of power that would make obsolete the ponderous *reciprocating* steam engine of his day.

Even as a boy he had wrestled with the problem—securing his first patent on an engine of the *rotary type* when only 19 years old.

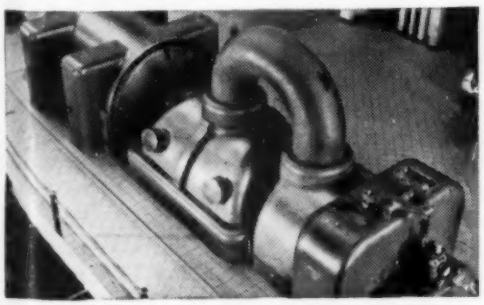
Years later, Westinghouse heard the exciting news about a *new type of rotary engine*, developed by Sir Charles Parsons in England. It was a steam turbine... using *jets of steam* to drive whirling blades.

Here was the answer to the problem that had fascinated Westinghouse since boyhood—and he promptly acquired the American rights.

The next few years were busy ones for George Westinghouse. With characteristic energy, he applied all his inventive genius in developing the still crude steam turbine into a *compact power source* for generating electricity.

Then, in 1900, Westinghouse installed a 2000-kilowatt steam turbine generator at Hartford, Connecticut – by far the largest then in existence.

It was the *first* practical central station turbine generator in America . . . a *new* application of whirling power that was to bring the benefits of electricity to people all over the world.



Westinghouse
PLANTS IN 25 CITIES OFFICES EVERYWHERE

TODAY . . . America annually produces more than two billion kilowatt hours of electricity and more than three-fourths of the generating capacity in America is in steam turbine generators. Westinghouse manufactured a large share of these turbine generators—some developing more than 200,000 horsepower each. In 1946, more than a million horsepower of Westinghouse steam turbines will go into American power plants.

Tune in: JOHN CHARLES THOMAS—*Sunday, 2:30 pm, EST, NBC* • TED MALONE—*Monday through Friday, 11:45 am, EST, American Network*

drawn as any on the physical and financial side. It should be designed to bring back to the campuses to complete their training all those whose courses were interrupted, including those not yet discharged from the services, and it should provide for selection and training of our ablest youth. Above all, it should be a well-rounded program which should set as its goal the provision of well-trained and adequate leadership in all fields, not only scientific but also in such fields as the social sciences, the humanities and the fields of social and ethical leadership. America has come face to face with the need to assure higher education for its ablest youth. We need a program of selection and training of our best brains. It will be fatal to avoid the challenge. I am glad the Westinghouse Science Talent Search so ably dramatizes the need for this and points to the method to be used in its realization. I am very happy to have had this small part in this great undertaking.

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PUBLIC HEALTH

Vaccine Can Increase Food

Developed to defend the United States and Canada against germ warfare, it can provide more nourishment for a hungry world.

By JANE STAFFORD

▶ MORE FOOD for a hungry world, particularly those regions most frequently visited by famine, can come from a vaccine developed to defend the United States and Canada against germ warfare.

The vaccine is for protection of cattle against rinderpest, or cattle plague. This highly fatal cattle disease has never existed in the United States or Canada and is now non-existent in the Western Hemisphere.

Even before those mysterious paper balloons from Japan began descending in regions close to the great cattle-grazing areas of western United States and Canada, however, military authorities were seriously concerned over the possibility of the virus of this disease being introduced by accident or by enemy action. If that had happened, the disease would have spread like wildfire through the herds. Lack of any previous contact with the disease makes our cattle highly susceptible to it.

To fight this war disease threat, a joint U. S.-Canadian commission was appointed by the Secretary of War and the Canadian Minister of National Defense. Members of the commission were: Dr. J. Craigie of the University of Toronto; Dr. R. E. Dyer, director of the U. S. National Institute of Health; Dr. E. B. Fred, President of the University of Wisconsin; Brig. Gen. R. A. Kelser of the U. S. Army Veterinary Corps; Dr. C. A. Mitchell of the Canadian Ministry of Agriculture; Prof. E. G. D. Murray of McGill University, Montreal; Dr. J. B. Reed of Queen's University, Kingston, Ont.; and Dr. H. W. Schoening of the U. S. Department of Agriculture.

On Grosse Isle in the lower St. Lawrence River, isolated island site of a former quarantine station, this commission early in 1942 assembled a group of scientists and technicians and gave them a two-part mission. First part was to prepare a vaccine to provide rapidly the means of surrounding an epidemic, should it occur, with a ring of immunized animals. The second part was to develop a more efficient or cheaper vaccine against rinderpest than those then available.

Almost a year before an atomic bomb dropped on Hiroshimo, the scientists were able to report: Mission accomplished. Now, with the war over, the first victims of Jap aggression will get the peacetime benefits of the mission.

The commission turned over to UNRRA one million doses of the vaccine for use in China. This will be shipped as soon as personnel and facilities can be established there for doing the vaccinating job, Dr. Irving G. Cashell at UNRRA headquarters states. Rinderpest is the Number One cattle disease in China today, Dr. Schoening told me. This plague attacks cattle of all kinds and interferes with agriculture because cattle are used in China as draft animals and beasts of burden. Rinderpest epidemics cut down the supplies of both meat and crop foods. UNRRA has a report of a severe one in one locality in China now, and the disease exists there always.

The vaccine which in time should free China and also India and Africa of this plague and famine threat was developed at Grosse Isle by the following scientists: Capt. James A. Baker, V. C., U. S. Army; Capt. H. K. Cooper, V.C., U. S. Army; Capt. Henry Griffiths, General List, Canadian Army; Lt. Col. M. W. Hale, V. C., U. S. Army; Capt. Dubois L. Jenkins, V. C., U. S. Army; Maj. Fred D. Maurer, V. C., U. S. Army; Capt. Thomas C. Robey, V. C., U. S. Army; Comdr. Richard E. Shope, M. C., U.S.N.R.; and Maj. R. V. L. Walker, P.L.D.G., Canadian Armored Corps.

Rinderpest, though it does not attack man, has been one of the most important maladies of livestock from earliest times. It has caused tremendous losses of cattle, killing from 70% to 100% of the animals in various epidemics. Several hundred years ago it spread from its earliest home in Egypt to European countries, where it raged almost constantly until the 1870's.

Extensive outbreaks were always associated with wars. In one three-year period one and one-half million cattle were stricken. The disease broke out in Belgium in 1921 after the first World War, but was eradicated. It still exists in Asia, India and East and South Africa, though in South Africa the well-organized veterinary police are able to keep it under a certain amount of control.

The Philippines, also, have been affected by rinderpest which attacked the carabao, important draft animals there. It was in the Philippines that Gen. Kelser, who was a member of the joint U. S.-Canadian commission, developed a vaccine against the cattle plague.

This vaccine and another similar one were made from the rinderpest virus obtained from cattle and inactivated by chemicals, such as formalin. It successfully protected animals, but only relatively small quantities could be made, since it had to be obtained from cattle. It also carried the danger of containing germs of other diseases that might have been present in the cattle from which the virus was obtained.

The scientists at Grosse Isle therefore turned to fertile hen's eggs, which have been used for production of yellow fever, typhus fever, influenza and other vaccines. They had some failures at first, but finally succeeded in growing the virus on the eggs in such a way that it lost most of its disease-producing power but kept its ability to give the cattle resistance to rinderpest.

In one crucial trial, 10 vaccinated and four non-vaccinated calves were put into the same pen where for 23 days they milled around together, drinking from the same water trough and eating from

each other's feed boxes if they wished. Then one more non-vaccinated calf was added to the group as a control and all of them were given shots of virulent rinderpest virus. All the vaccinated animals proved to be immune to the disease. All the non-vaccinated ones developed the disease and died or were destroyed at the point of death.

At one stage of the work, the possibility of chickens and other birds being a reservoir of the disease, which might be spread from them by blood-sucking insects, was considered. This developed from the unique finding that embryos which had been infected with the virus would develop into chickens. This has never occurred in embryos infected with other viruses. The baby chicks had the virus in their bodies for as long as five days, but fortunately it did not get into the blood where it would have been available to insects for possible transfer to cattle.

The scientists at Grosse Isle worked not only under strict military secrecy but under constant and most vigilant precautions against possible escape of the virus from their island laboratory. The danger of accidentally starting an epidemic of rinderpest in Canada or the United States was so great that, as one of many precautions, no hay was fed to any of the animals. This was because of the difficulty of disposing of the remnants, since even a shred of infected hay might cause a disastrous epidemic.

Calves vaccinated with the egg virus are solidly protected against rinderpest within 10 days after vaccination. The vaccine causes a mild disease in the calves but this mild form of the disease does not seem to be contagious.

The undried virus keeps well at temperatures well below freezing, but rapidly loses its potency at room temperature. It therefore has to be dried from the frozen state. For their first practical drying apparatus, the scientists used a defective depth bomb casing which happened to be available in their island locality. Early in 1945 they obtained a commercial experimental dessicator.

The dried vaccine packed in vacuum keeps as long as 15 months at temperatures close to freezing, but should be given to cattle within 12 hours after reconstituting it from the dried state.

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• Books of the Week •

BIOLOGY AND CONTROL OF THE AMERICAN DOG TICK—Carroll N. Smith, Moses M. Cole and Harry K. Gouck—*Government Printing Office,* 74 p., diagrs. and illus., 20 cents. U. S Technical Bull., No. 905.

BURMA SURGEON RETURNS—Gordon S. Seagrave, M.D.—*W. W. Norton,* 268 p., illus. and maps, $3. The story of Dr. Seagrave's medical mission in Burma after the Japanese occupation. He writes of the medical problems and achievements of his unit and of the future of medicine and missions.

COMMON-SENSE BUSINESS LEADERSHIP: A Manual of Human Relations—G. E. Fosbroke—*Duell,* 177 p., $2.50. A definition of business leadership and suggestions about how it may be developed with a knowledge of the basic principles of human relations and liberal applications of common sense.

THE ELECTRON MICROSCOPE: An Introduction to Its Fundamental Principles and Applications—E. F. Burton and W. H. Kohl—*Reinhold,* 325 p., diagrs. and illus., $4. A presentation of the physical principles upon which the operation of the electron microscope is based, making no assumptions in regard to the technical knowledge of the reader.

ESSENTIALS OF GENERAL CHEMISTRY—B. Smith Hopkins and John C. Bailar, Jr.—*Heath,* 520 p., tables and illus., $3.50. A textbook for use in college freshman classes.

AN INTRODUCTION TO EDUCATIONAL STATISTICS—C. W. Odell—*Prentice-Hall,* 269 p., tables, $4.67. A textbook pre-supposing no preparation in mathematics beyond high school algebra and geometry and designed to cover a one semester's course.

AN INTRODUCTION TO HUMAN ANATOMY—Clyde Marshall, M.D., revised by Edgar L. Lazier—*W. B. Saunders,* 418 p., illus., $2.50, 3rd ed. A textbook for use in colleges.

LET'S FIND OUT: A First Picture Science Book—Herman and Nina Schneider—*William R. Scott,* 39 p., illus., $1.25. Experiments with very simple equipment to be found around the house. For 6 to 9 year olds.

LISTENING TO MUSIC CREATIVELY—Edwin J. Stringham—*Prentice-Hall,* 479 p., illus., $5. An introduction to the broad world of music, revealing some of its inner workings, its historical traditions, its vocabulary, and establishing a practice for general listening.

MARINE MICROBIOLOGY: A Monograph on Hydrobacteriology—Claude E. ZoBell, *Chronica Botanica,* 240 p., tables and illus., $5. Foreword by Selman A. Waksman.

THE PRINCIPLES OF HEREDITY—Laurence H. Snyder—*Heath,* 450 p., tables and illus., $3.75, 3rd ed. An introductory textbook developing the principles of heredity as far as possible on the basis of organisms with which the reader is familiar. This revised edition includes material on the Rh factors, the bearing of these factors on feeble-mindedness, etc.

SUNSPOT CHANGES AND WEATHER CHANGES—H. H. Clayton—*Smithsonian Institution,* 29 p., diagrs. and tables, 20 cents. Smithsonian Miscellaneous Collections, Vol. 104, No. 19.

WOMAN AS FORCE IN HISTORY: A Study in Traditions and Realities—Mary R. Beard—*Macmillan,* 369 p., $3.50. A survey of the relationship between men and women from earliest times to the present and of what history shows of the way in which men and women have actually lived and worked together.

Science News Letter, March 16, 1946

MEDICINE

Production of Hemoglobin Speeded After Hemorrhage

➤ PRODUCTION of hemoglobin, which gives blood its red color, may be speeded after severe hemorrhage by doses of a vitamin and another chemical derived from a vitamin, it appears from studies by Dr. M. L. Scott, Dr. L. C. Norris and Dr. G. F. Heuser, of the Agricultural Experiment Station and School of Nutrition at Cornell University.

Hens that had lost about one-third of the blood in their bodies made up the loss with hemoglobin quantities back to normal within eight to nine days when given the two vitamin-chemicals, the scientists report. (*Science,* Mar. 8)

The two chemicals that produced this speedy hemoglobin regeneration in the hens are the L. casei factor, which is a form of the vitamin, folic acid, and pyracin, also called pyrodoxic acid and derived from another vitamin, pyridoxine.

Science News Letter, March 16, 1946

France is the first of the liberated countries to start *penicillin* production.

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·New Machines And Gadgets·

WHEELBARROW that easily passes over ordinary obstacles in its path has an extra wheel mounted in front of and above the regular wheel. The two wheels carry an endless tractor-type tread which, when it comes in contact with an obstacle, raises the front of the barrow over it.

Science News Letter, March 16, 1946

NONSPILLABLE inkwell is nearly spherical in shape but remains upright because the wall of the lower part is thick and heavy. The opening through which the pen is inserted is a tube projecting inward to about the center of the sphere. If upset, this tube prevents spilling.

Science News Letter, March 16, 1946

RUBBER GLOVE for household use has a solid inner layer of rubber latex and an outer layer containing many minute open pits that constitute a surface roughening for the inner layer. It is not slippery when wet, it is claimed.

Science News Letter, March 16, 1946

FOG DISPENSER for lifting fogs on airfield runways, an improvement on the English "Fido," burns fuel oil instead of gasoline. The system consists of a series of burners, ignited electrically from the tower, each of which has an atomizer to prepare the fuel for complete combustion.

Science News Letter, March 16, 1946

PLASTIC "LUNG" for artificial respiration weighs only 60 pounds, about one-eighth the weight of standard iron lungs, permitting a patient to sit up, or perhaps walk or drive. The picture shows

its application to a bed patient. The unit is convenient for lifesaving stations and small hospitals. Photograph from Ziff-Davis.

Science News Letter, March 16, 1946

"ELECTRIC HAND" is the key to a so-called electronic myodynemeter to measure the extent of muscle impairment and recovery in infantile paralysis cases. The "hand," which, in use, is pressed against the muscle, contains a delicate wire strain gauge whose electrical resistance changes as it is stretched.

Science News Letter, March 16, 1946

SYNTHETIC RUBBER HOSE reinforced with Fiberglas inner braid is found satisfactory for carrying hot plastic paint at a temperature of 300 degrees Fahrenheit to spray nozzles used in painting ship hulls. The hose has the tensile strength and heat-resisting qualities required.

Science News Letter, March 16, 1946

CALCULATING DEVICE, composed of three concentric celluloid printed disks which can be rotated on the same center, is used to determine the amount of radiation required for steam and hot water heating systems. When the disks are properly set, printed figures on them give the answer.

Science News Letter, March 16, 1946

If you want more information on the new things described here, send a three-cent stamp to SCIENCE NEWS LETTER, 1719 N St., N. W., Washington 6, D. C., and ask for Gadget Bulletin 302.

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Question Box

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CHEMISTRY

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In what way is the Army stifling science? p. 163.

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GENERAL SCIENCE-EDUCATION

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MEDICINE

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